

If the tag transmitter is actually occupying a much greater bandwidth than 100 kHz, then it is using the spectrum inefficiently, and additional filtering should be added to the transmitter. Unfortunately, there is no requirement for equipment authorization and Amtech, therefore, is not required to submit measurements. I cannot determine whether this is the cause of the extremely inefficient channel spacing.

Krauss Affidavit ¶¶ 19-20.

31. Dr. Krauss discusses other examples of Amtech's inefficient spectrum usage, including lack of polarization isolation, poor frequency stability, and out-of-band band emissions. (Krauss Affidavit ¶¶ 22-26, 30). These further illustrate that the "Tragedy of the Commons" is occurring in this band today and will continue to occur and increase in the absence of Commission action to assure sound frequency management.

2. Narrowband Transmissions Interfere with Wide Area AVM Services.

32. As shown in Teletrac's technical analysis, signals from devices such as Amtech tag readers cause "dead zones" of up to several miles around the transmission source. (Teletrac Petition, Appendix 2 at pp. 27-28). Additionally, fixed receivers located within these dead zones can be rendered completely useless. This degrades coverage in an area several orders of magnitude larger than the tag reader's intended coverage area. MobileVision believes the problem could be even more severe than depicted by Teletrac. (MobileVision Comments, Attachment A at 1).

33. Narrowband proximity-sensing and wideband pulse-ranging systems have greatly different characteristics:

TYPE OF SYSTEM	Narrowband Proximity-Sensing	Wideband Pulse Ranging
Coverage Radius	less than 100 feet	50 miles
Purpose of System	Toll gates or identify vehicle entering airports freight yards, etc. Secondary uses could include some status information.	Real-time location tracking for business vehicles, stolen cars and emergency roadside assistance.

34. When FCC rules are ignored and narrowband systems, such as Amtech tag readers, can use frequencies reserved for wideband systems, wideband AVM customers will experience a loss of service. Under the interim rules, this problem will have no permanent resolution and will require repeated regulatory intervention. Although Amtech has ultimately cooperated with Teletrac where interference has arisen, correcting the problems has been time-consuming and only accomplished when Teletrac, rather than Amtech or its customers, paid the cost of remedying the problem.

35. For example, Teletrac identified Amtech tag readers at Los Angeles airport as a principal cause of continuing interference. Resolution of these recurring significant interference problems required months of negotiation as well as payments by Teletrac to Amtech in order for Amtech to adjust its tag readers. Without that payment, these negotiations conceivably could have gone on indefinitely, while Teletrac and its users

suffered the effects of the interference. The comments of the Los Angeles Department of Airports confirm what occurred and how sharing is acceptable to Amtech users so long as Teletrac assumes the costs of the sharing:

[T]he Department of Airports has allowed PacTel to assume costs associated with modifications of transmitter frequencies where PacTel's technology could not exist with our licensed AVM application.

City of Los Angeles Comments at 2 (emphasis supplied). Amtech also states: "Amtech and PacTel have cooperated without friction. To date, PacTel has compensated Amtech or its customer/users for the costs of implementing such changes." (Amtech Comments at 28, n.55) (emphasis supplied). Similar incidents have occurred in Orange County, California and Dallas, Texas.

36. Narrowband signpost systems which meet the specific requirements of the rules, including substantial limitations on output power, are subordinate, in the hierarchy established by the Commission rules, to Teletrac and other wideband systems.^{24/} Apparently in the last two years, Amtech has succeeded in persuading the Association of American Railroads ("AAR") and the American Trucking Associations -- both of whom have filed comments in this proceeding in opposition to the Teletrac Petition -- to adopt standards focusing on Amtech technology, which do not have the limitations required by the rules. These organizations claim it would be inconvenient if they were required to shift their standard to another frequency band, although there is no significant reason

24. 47 C.F.R. § 90.239(e)(3).

precluding that shift. These standards were only recently adopted, and they contravene the interim AVM rules requiring placement of narrowband systems operating, as Amtech does, in a range other than 904-912 and 918-926 MHz.^{25/} There are only 1309 Amtech transmitters, so shifting them to a different frequency would not be an undue burden. In any event, Teletrac has not asked that current licenses be shifted. The Teletrac proposal is prospective only.

37. The real argument advanced by Amtech seems to be that it has already usurped the use of this spectrum. Parties such as Teletrac, therefore, who relied on the Commission's regulation, are just out of luck -- i.e., Amtech claims some form of squatter's rights or adverse possession. That is inconsistent with the law and sound policy. In fact, the tag reader parties seem to be at odds with one another as well as with Teletrac. Allen-Bradley, which operates at 915 MHz by Commission waiver, does not want any tag reader licensees transferred to 912-918 MHz, where Allen-Bradley operates. (Allen Bradley Comments at 4). Allen-Bradley apparently is concerned that a good deal of

25. AAR itself sought and received exclusivity for its Advanced Train Control System. That exclusivity is in the 896-901 and 935-940 MHz bands. AAR required exclusivity to reduce interference and other applicants were to be shifted to other frequencies. (*Id.*). Waiver of Sections 90.621(d), 90.623(a), 90.629, 90.633, and 90.651(c) of the Commission's Rules to License Use of Six Conventional 900 MHz Frequency Pairs for an Advanced Train Control System, 3 FCC Rcd. 427 (1988).

congestion in 912-918 MHz would cause interference to Allen-Bradley tag readers.^{26/} It is exactly that type of interference concern that prompted Teletrac's Petition.

38. Obviously, the Commission considered the different nature of narrowband and wideband pulse-ranging systems in 1974 when it allocated two different frequency bands for each distinct type of operation. The Commission never envisioned the operation of narrowband systems on wideband segments, and Teletrac's experience with Amtech illustrates the wisdom of that approach.

3. Co-Channel Separation Is Required for Successful Wideband AVM Operations.

39. First, it should be made clear what Teletrac did not propose. Teletrac did not propose exclusive use of the 904-912 and 918-926 MHz bands, a point even Amtech concedes. (Amtech Comments at 27-28). Teletrac and other wideband AVM licensees are, and will continue to be, subordinate to ISM and government systems. Teletrac has specifically designed its system so as to avoid interference with those higher priority uses and has not proposed a change in the existing hierarchy of use and has no plans to do so. Moreover, Teletrac has also specifically proposed "grandfathering" the existing narrowband licenses that, regardless of the Commission's rules, are nonetheless currently operating in

26. Allen-Bradley's technology transmits data from the tag through re-radiation of the modulated second harmonic of the incoming frequency. Had Amtech used that type of system, it might have experienced less interference between readers, thereby permitting Amtech to cut its 2 MHz spacing to 100-150 kHz with little difficulty. This is merely another example of Amtech's disregard of spectrum efficiency principles.

the band. Signpost systems, such as those operated by Amtech, provide a valuable service but must do so in accordance with good frequency use.

40. The Teletrac Petition advanced a number of sound policy reasons supporting its proposal for geographic separation of co-channel systems. (Teletrac Petition ¶¶ 33-45). Specifically, co-channel separation is necessary to maximize system capacity, protect service quality, and encourage development of new services. (Id. ¶ 33). Given the overuse of this public resource, i.e., a "Tragedy of the Commons" (id. ¶ 35), Teletrac's proposal would have very positive benefits for the consumer, the licensee, and the allocation of Commission resources. (Id. ¶ 36).

41. Other wideband licensees agree with Teletrac's views. For example, Location Services states:

LS agrees that co-channel interference should be avoided if AVM systems are to realize practical cost/performance constraints and technical system performance objectives. Furthermore, the 8 MHz wideband proposal would provide an opportunity to minimize cost of network and mobile AVM equipment, while maximizing both location accuracy and system capacity.

LS Comments ¶ 6, at 3. See also MobileVision Comments at 10; Southwestern Bell Comments at 5. Teletrac proposed a standard service area encompassing a fifty-mile radius from the center of each major urbanized area recognized in the Commission's rules, with a co-channel separation requirement of 110 miles in urbanized areas, thereby permitting a major metropolitan area to be developed under a single license. (Teletrac

Petition ¶ 44).^{27/} This would assure implementation of multi-market AVM systems. Similar service area requirements have been used by the Commission. (*Id.* ¶ 45). Most recently, the Commission proposed service area protection criteria for the new Interactive Video Data Services.^{28/} Similar criteria have been established for Specialized Mobile Radio Systems,^{29/} and for Multiple Address Systems.^{30/} Southwestern Bell has proposed use of cellular service areas. (SBC Comments at 5). Teletrac does not object to consideration of this alternative in the Notice of Proposed Rulemaking.

**B. Co-Channel Separation Would Not Create a
Duopoly in Any Economic Sense.**

42. According to Amtech, Teletrac's Petition "requests the creation of a duopoly" for wide pulse-ranging AVM. (Amtech Comments at 37). Amtech goes so far as to say that this "duopoly" will "impede competition" in some amorphous way. (Amtech Comments at 38). Amtech, however, offers no reasons or support for that conclusion other than the fact that Teletrac is affiliated with PacTel Corporation ^{31/} and that

27. Outside major urbanized areas, the coordinates for the center of the service area could be designated by the licensee. (*Id.*)

28. Amendment of Parts 0, 1, 2 and 95 of the Commission's Rules to Provide for Interactive Video Data Services, Report and Order, Gen. Dkt. No. 91-2 FCC 92-22 ¶ 62 (Feb. 13, 1992) (adopting cellular service area).

29. 47 C.F.R. § 90.621(c) (1991).

30. Amendment of the Rules and Regulations to Re-Channel the 900 MHz Multiple Address Frequencies, PR Dkt. No. 87-5, 3 FCC Rcd. 1564 (1988).

31. Teletrac is owned only in part by PacTel Corporation. 49% of its shares are held by another company unaffiliated with PacTel.

MobileVision has an affiliation with Ameritech. Of course, Amtech is not a competitor of Teletrac's -- its signpost systems are used for a wholly different purpose.

43. In fact, Amtech should know that its allegations are baseless for several reasons. First, Amtech in its own comments chooses to ignore the fact that there are other providers of vehicle location services, an analysis Teletrac provided in its Petition (E.g., Teletrac Petition ¶ 5). For example, Trimble Navigation Limited has deployed a system using the Global Positioning System ("GPS") in Los Angeles. Trimble claims its system "is able to pinpoint the exact location of moving vehicles, pickup and delivery addresses, landmarks and other information." (Teletrac Petition, Attachment K). There are numerous other providers as well, including LoJack, Coded Communications, II Morrow, Autotrac, and Coverage Plus. Indeed, at the same time Amtech makes these conclusory claims, its own counsel, in another filing on behalf of the Amtech parties, acknowledges that significant competition exists. (Pinpoint Comments at 18-20).^{32/}

44. Pinpoint asserts that if LoJack can provide adequate stolen vehicle recovery service, the only service LoJack currently offers, then two 8 MHz blocks are unnecessary.

32. While the Amtech parties seek to insinuate that Teletrac is seeking some sort of duopoly, Amtech's own SEC filings suggest far more serious possible competitive problems. SEC requirements forced Amtech to disclose in its 1991 Form 10-K that Amtech is, at present, the only company that complies with the mandatory standard AAR adopted in 1992. Thus, while claiming a potential non-existent "duopoly," Amtech has established a real monopoly.

(Pinpoint Comments at 19). However, stolen vehicle recovery is only one Teletrac service. As various users of Teletrac have attested to the Commission, Teletrac technology provides a wide variety of public interest benefits. (See, e.g., Teletrac Petition, Exhibits A-J).

45. Moreover, affiliation between Teletrac and a Regional Holding Company ("RHC") is of no competitive significance. As the Court of Appeals for the District of Columbia Circuit stated about amorphous claims of "impeding competition":

[T]he [Department of Justice] is surely correct that no damage to competition -- through 'leverage' or otherwise -- can occur unless the BOCs can exercise market power. . . . Accordingly, unless the entering BOC will have the ability to raise price or restrict output in the market it seeks to enter, there can be no substantial possibility that it could use its monopoly power to "impede competition."^{33/}

Amtech makes no allegation -- indeed, it could not -- that Teletrac will be able to exercise market power in any market. Thus its conclusory claims of "impeding competition" are meaningless.

46. Teletrac asked Richard L. Schmalensee, Professor of Economics at Massachusetts Institute of Technology and a former member of President Bush's Council of Economic Advisors, where, among other things, he had primary responsibility for telecommunications policy, to review the "duopoly" allegations. Professor Schmalensee's affidavit is Attachment B to these reply comments. According to Professor Schmalensee:

33. United States v. Western Electric Co., 900 F.2d 283, 296 (D.C. Cir. 1990) (emphasis supplied).

[A]n economically meaningful duopoly exists if and only if a supplier of a good or service faces only one competitor. As Pinpoint's own opposition acknowledges, there are other competitors in the AVM market: Lo-Jack, Trimble and numerous other firms provide various types of AVM services, in a variety of frequency bands. Moreover, nothing in the proposed rulemaking prevents Pinpoint, Amtech or any other firm from developing and marketing new technologies for wideband or narrowband systems or developing entirely new AVM services. Contrary to Pinpoint's and Amtech's assertions, therefore, Teletrac's proposal would foster a competitive AVM marketplace.

Schmalensee Affidavit ¶ 5.

C. "Open Entry" and Sharing Between AVM Providers Would Reduce Spectrum Efficiency and Retard Innovation._____

47. The Amtech parties and Mark IV all propose open entry and sharing, claiming that in such an environment a thousand flowers will bloom. (E.g., Mark IV Comments at 3, Amtech Comments at 27, Pinpoint Comments at 10.) However, logic, experience, and available technical data demonstrate the end result of such a proposal would retard innovation in the AVM area.

48. As MobileVision notes in its technical analysis, the Commission expected that wideband pulse ranging systems would be "exclusive" because of the potential for interference and the large capital investments needed to build a commercially viable AVM system. (MobileVision Comments, Attachment A at 3-7). In fact, the 1974 Report and

Order contemplated no more than one system per wideband segment.^{34/} If open entry were technically and commercially feasible, Teletrac would not oppose open entry and sharing. Teletrac has found, however that the Commission's insight in 1974 predicted the operational realities of today's AVM system.^{35/}

49. Pinpoint advocates that wide-band pulse-ranging systems share the spectrum.^{36/} (Pinpoint Comments at 10). Other commentators make similar points. (E.g., Amtech Comments at 44). Shared spectrum use is appropriate for some systems, such as cordless telephones. However, wideband pulse-ranging systems have a substantial fixed network covering thousands of square miles. They require adequate co-channel separation to be viable. Even Pinpoint concedes "there may be practical limits to the number of . . . [wideband pulse-ranging] systems that reasonably can be accommodated within the 902-928

34. 1974 Report and Order ¶ 10, 30 RR2d at 1670-1671; Teletrac Petition ¶¶ 37-38.

35. Pinpoint admits that 8 MHz is the minimum bandwidth needed to mitigate multipath interference and supply the accuracy and capacity to support a variety of AVM services. (Pinpoint Comments at 26). SBC, on the other hand, fails to understand the operational limitations of a 4 MHz AVM system and proposes lengthy analysis by the Commission -- analyses Teletrac and others have already completed.

36. The Pinpoint claim that Teletrac seeks exclusivity in order to protect a "fragile" system design is simply wrong. (Pinpoint Comments at 15-17). Teletrac chose a design that provides protection against interference in a shared environment, including government users and ISM applications. Unlike Pinpoint, Teletrac has the benefit of several years of experience in designing, installing and operating wideband pulse-ranging systems. The Commission should give little credence to Pinpoint's unsupported allegations that Teletrac's design is inefficient and "fragile."

MHz band " (Pinpoint Comments at 9) (emphasis supplied). In fact, Pinpoint admits that its technology is susceptible to interference from in-band transmitters. (*Id.* at 21, n.42).

50. There is only a limited margin available in any system for dealing with interfering signals in a band that will continue, as this one will, to have a hierarchy of users. That margin must be used to assure that, for example, an AVM service will be able to operate effectively in the presence of ISM and other users. Teletrac's experience suggests there is little margin left over to deal with the strong signals that would emanate from a co-channel AVM provider.

51. "Open entry and sharing" has been an often advanced alternative. But, the reality is that it will not work for sophisticated technologies such as this type of service. For example, in the period before the Commission's 1981 cellular allocation, Millicom proposed a sharing environment, claiming that sharing would result in greater competition:

. . . the proposal troubles us because Millicom has failed to explain adequately how its frequency sharing proposal, which is based on design concepts different from those explored to date, would actually work. . . . In short, we are unable to conclude that the Millicom scheme would permit the efficient use of spectrum without the need for further development. In our view, to delay the offering of commercial cellular service to the public in order to await such development is unwarranted.^{37/}

37. An Inquiry into the Use of the Bands 825-845 MHz and 870-890 MHz for Cellular Communications Systems; and Amendment of Parts 2 and 22 of the Commission's Rules Relative to Cellular Communications Systems, 86 F.C.C.2d 469, 478 (1981) (hereinafter "Cellular Systems").

The Commission found:

With respect to the Millicom proposal, while we support its goal of unlimited entry, we are unable to find that the proposal will provide efficient use of spectrum and facilities band competition, especially without the need for further development.^{38/}

52. The fundamental difference between the various parties is that only Teletrac has deployed high capacity multi-product AVM systems that require significant capital investment. According to Professor Schmalensee:

Band sharing can, of course, be a valuable technique for spectrum management in some situations in which interference is not of great economic significance. But keeping the 902-928 MHz band "free and open" appears likely to increase the production of interference that makes it impossible to locate vehicles reliably using existing technology. When and where this occurs, the value of investments in AVM systems would be significantly reduced. The prospect of having significant investments subject to this sort of risk must inevitably reduce the incentive to invest in the AVM marketplace. It will be very difficult to attract capital to this market as long as licensee must face the constant threat of economically catastrophic interference. Thus, the "open entry" advocated by Pinpoint and Amtech will significantly discourage the large-scale investment in the use of AVM technology that is necessary to produce either competition or consumer benefits. Failure to adopt co-channel separation may itself prevent the emergence of a competitive market.

Schmalensee Affidavit ¶ 6.^{39/}

38. Reconsideration Opinion, Cellular Systems, 89 F.C.C.2d 58, 62 (1982).

39. Pinpoint's "off the cuff" assertion that its technology will meet evolving IVHS requirements whenever they are adopted and no matter what they may be, while Teletrac cannot do so (Pinpoint Comments at 29), is totally unsupported and certainly could not be based on Pinpoint's undemonstrated capabilities.

53. The Commission has also recognized the principle that "exclusivity" -- which is a relative term with respect to AVM service given the hierarchy of users throughout the band -- provides spectrum efficiencies:

We have granted exclusive use of frequencies in the past to encourage specific spectrum efficient technologies such as trunking Other spectrum efficient techniques, such as cellular radio and some digital multiple access techniques, are inefficient or impractical without exclusivity as presently implemented.

It has also been argued that licensees will be more concerned about spectrum efficiency if they have exclusive rights to use a channel in a given area. While a licensee with exclusive use of one or more channels may continue to be inefficient in the short run, in the long run, rational licensees will seek to maximize the value of "their" spectrum, much as they would seek to maximize the value of an asset such as land The concept of exclusivity has gained such general acceptance that it has become viewed as an automatic feature of new allocations to the PLMR services.^{40/}

54. In short, the Teletrac proposal is consistent with Commission policies promoting spectrum efficiency and encouraging innovation. As Professor Schmalensee states:

Nothing in Teletrac's proposal limits Pinpoint's ability to innovate. Indeed, by furthering the development of a competitive AVM marketplace, Teletrac's proposal is likely to increase the value of any genuine innovations Pinpoint may produce. SBC and Mark IV ask for a time-consuming examination of a wide range of issues, including the channel plan that has been in force since 1974 and that has shaped Teletrac's and others' investments in the AVM marketplace. The

40. Notice of Inquiry, Spectrum Efficiency in the Private Land Mobile Radio Bands in Use Prior to 1968, 6 FCC Rcd. 4133 ¶ 52 and 53 (1991).

Commission must recognize that delaying adoption of permanent rules that deal adequately with interference is a decision that will deprive consumers of benefits they can have today. Choice cannot be avoided because delay is not free: in deciding whether to act, the Commission is in effect choosing between speculative claims of increased future benefits and present real benefits to consumers.

Schmalensee Affidavit ¶ 7.

**D. Teletrac's Forward Link Proposal
Makes Sound Technical Sense.**

55. Teletrac's proposal for a forward link is supported by MobileVision. (MobileVision Comments at 14). SBC also agrees that a forward link is necessary. (SBC Comments at 4). Again, the Amtech parties seem to object to what should be unobjectionable. (See Amtech Comments at 43; Pinpoint Comments at 20). Even Pinpoint agrees with the need for some sort of forward channel. (Pinpoint Comments at 20).

56. In wideband pulse-ranging AVM systems, the forward link is an essential element of system capability. As explained in Teletrac's Petition, the forward link is essential to transmit a signal from the network control center to the RLU to initiate a response from the RLU. (Teletrac Petition ¶ 30). Thus, the forward link is the "interrogation" link and its bandwidth determines the number of interrogations that can occur per second. The forward link is essential to AVM services, and will not be used for paging or general messaging services, contrary to Amtech's speculation. (Amtech Comments at 43). Pinpoint claims that it has an undefined forward link requirement on a

system which requires optimally either 16 or 24 MHz. If the Commission were to give Pinpoint 904-912 and 918-926 MHz, then Pinpoint claims it does not need any more spectrum for a forward link. (Pinpoint Comments at 20).

57. Pinpoint alleges that operation of the 250 kHz forward link is inefficient. Pinpoint suggests these signals would act as "jammers" that would require system operators to expend "great effort" to eliminate these signals from their desired signals. (Pinpoint Comments at 21, n.42). One simple solution is to use band rejection filters at each fixed receive point to remove potential undesired forward link signals. These low-cost filters are readily available and installation can hardly be considered a "great effort."^{41/}

58. LS suggests the forward link should be shifted to the band edge. (LS Comments ¶ 8, at 8). However, that suggestion would have no practical effect on spectral efficiency since band rejection filters are readily available. On the other hand, any such shift would have a substantial adverse financial impact on Teletrac given the fact that Teletrac has a significant number of RLUs and a fixed system operating on the existing forward link.

41. While Pinpoint expresses grave concern about a known fixed forward link, Pinpoint expresses no similar concern about Amtech's "jamming transmitters" which Amtech currently places at any arbitrary frequency and any geographic location a customer chooses.

**E. Various Teletrac Proposals Evoked
No Opposition.**

1. The Definition of AVM.

59. Teletrac proposed expanding the definition of AVM to encompass a greater number of services. No commentors objected to that expanded definition. MobileVision proposes alternative language. (MobileVision Comments at 15). Teletrac does not object to that suggested change and supports either approach.

2. Type Acceptance.

60. No party other than LS has commented on Teletrac's type acceptance proposal. LS agrees that type acceptance should be required, but wants acceptance requirements delayed until licensees stabilize their design. (LS Comments at 2). To avoid an undue regulatory burden, LS suggests an 18-month temporary authorization following commercial introduction before requiring type acceptance. (*Id.* at 3). Teletrac has no objection to this recommendation.

**F. The Communications Act and the IVHS
Act Support the Teletrac Proposals.**

61. Amtech and Pinpoint make several legal arguments that need little response. For example, both argue that the Teletrac Petition is inconsistent with the requirements of

Section 332 of the Communications Act, 47 U.S.C. § 332(a).^{42/} The rules that Teletrac seek, however, improve the efficiency of spectrum use, reduce regulatory burdens; and would provide services to the largest feasible number of users -- all goals set out in the statute along with the interservice sharing goal noted by Amtech and Pinpoint. (47 U.S.C. § 332(a)). Section 332(a) is written in the disjunctive rather than the conjunctive^{43/} and certainly is not offended by the rules Teletrac proposes.

62. Nor does Section 7 of the Act, 47 U.S.C.A. § 157, present any meaningful argument for these commentors. Teletrac is not opposing a new technology, it is merely seeking permanent rules to permit widescale implementation of its own commercial technology and new services. Indeed, if anything, Amtech and Pinpoint seem to be the opponents of new technology or services required to bear the burden of proof here. Under the construction Amtech and Pinpoint claim for section 157, the Commission could never conduct business or announce any rules. The argument advanced simply falls of its own weight.

63. Finally, these parties claim the IVHS Act supports their position. (Pinpoint Comments at 14; Amtech Comments at 37). By enacting the IVHS Act, however, Congress intended to promote all technologies that improve surface transportation (such as

42. Amtech misquotes this statute in its comments. (Amtech Comments at pp. 20, 44).

43. Cf. In the Matter of Amendment of the Commission's Rules to Allow the Selection from Among Certain Applications Using Random Selection or Lotteries Instead of Comparative Hearings, 57 RR2d 427, 453 (1984).

Teletrac's), not just Pinpoint's or Amtech's. In short, the statutory arguments advanced by these commentors have no weight at all.

CONCLUSION

For the reasons stated in its Petition and in these Reply Comments, the Commission should grant the Petition submitted by Teletrac and issue a Notice of Proposed Rulemaking incorporating Teletrac's proposed rules.

Respectfully submitted,

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Dated: August 7, 1991

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CERTIFICATE OF SERVICE

I hereby certify that on the 7th day of August, 1992, a copy of the REPLY COMMENTS OF NORTH AMERICAN TELETRAC AND LOCATION TECHNOLOGIES IN SUPPORT OF PETITION FOR RULEMAKING was served by first class mail, postage prepaid or by hand on the parties of record noted below:

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Kristen E. Barr

Date: August 7, 1992

BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C.

In the Matter of)	
)	
Amendment of Section 90.239 of the)	RM No. 8013
Commission's Rules to Adopt Permanent)	
Regulations for Automatic Vehicle)	
Monitoring Systems)	

AFFIDAVIT OF JEFFREY KRAUSS

JEFFREY KRAUSS, being duly sworn, deposes and
says:

1. I am President of Telecommunications and
Technology Policy, a consulting firm in Rockville, MD. I
received my PhD in Physics from Case Western Reserve
University in 1969. My expertise is in the area of
regulation and management of the radio spectrum.

2. I am an active participant on a number of FCC,
radio and telecommunications policy and standards
committees including: the FCC Advisory Committee for the
1992 World Administrative Radio Conference; the FCC
Advisory Committee on Standards for High Definition
Television; the Electronics Industries Association Point-
to-Point Microwave Communications and Satellite
Communications Sections; and the U.S. CCIR IWP 11/6 and
JIWP 10-11-3 Committee. My monthly column "Capital

Currents" appears in the Communications Engineering and Design magazine. I have also published and spoken on a number of telecommunications issues over the past several years, including seminar presentations at Stanford University Department of Engineering Economic Systems and Conferences of the Institute of Electrical and Electronics Engineers as well as publications in Microwave Journal, Telematics, Telecommunications, and Broadcasting Magazine. In addition, I have prepared comments and studies for over 25 FCC dockets and investigations.

3. I have reviewed a number of documents prepared by AMTECH Corporation describing its RF Identification system that utilizes low power transmitters called "tags" to receive, modulate and retransmit radio signals. It is my conclusion that the AMTECH system operating in the 902-928 MHz range makes very inefficient use of the radio spectrum. Specifically, the output power, duty cycle, channel spacing, frequency stability and the unregulated nature of the tags all contribute to spectrum inefficiency. As a matter of sound policy, the FCC should take a number of steps to improve the spectral efficiency of this and other RF Identification systems.

4. My conclusions regarding AMTECH are based on the following analyses.

Output Power.

5. The AMTECH AR2200 RF Module, transmitting in the 902-928 MHz band, is typically licensed for an output power of 2 watts. This appears to be far greater than is needed for most applications. As a result, these units are more likely to cause interference to other radio services in this band than necessary.

6. AMTECH has installed 1309 transmitters. (AMTECH Opposition to Teletrac Petition for Rulemaking, p. 40.) These appear to be used primarily for highway, bridge and parking lot toll collection; railroad car and intermodal container identification; and other vehicle fleet tracking uses. (AMTECH Opposition to Teletrac Petition for Rulemaking, Attachment A.) For most of these intended uses, the distance between the transmitter/reader and the reflecting tag should be about 15 feet or less.

7. For example, I have examined a license application depicting what is a typical configuration for most of the AMTECH installations. The Vintage Club application (File No. 330966) is for an AMTECH transmitter installation operating at 911.990 MHz and 918.010 MHz, and contains an attachment entitled "Supplemental Information for 47 CFR 90.239d." The proposed use is to track tagged vehicles as they pass through inbound and outbound guardhouse gates of a residential neighborhood. Attached to the license application is a drawing showing the